

## **KENTUCKY DEPARTMENT OF EDUCATION**

### **STAFF NOTE**

#### **Review Item:**

Update on mathematics initiatives from the Kentucky Department of Education

#### **Applicable Statute or Regulation:**

KRS 158.842 (Committee for Mathematics Achievement); KRS. 158.840; KRS 158.844; 704 KAR 3:530 (Mathematics Achievement Funds); KRS 164.525 (Center for Mathematics); KRS 158.6451; KRS 156.553 (Teachers Professional Growth Fund) KRS 158.860 (End of Course Assessment)  
NCLB Title II, Part B (Mathematics and Science Partnership)

#### **History/Background:**

***Existing Policy.*** The purpose of this review item is to provide the Kentucky Board of Education (KBE) with an update on current mathematics initiatives. Most of these mathematics initiatives involve collaboration with other offices within KDE; however, some of the initiatives include a partnership with outside agencies. At the October 2006 Board meeting, the KBE heard a report on components of the Mathematics Achievement Fund from Dr. Bill Bush, Chair of the Committee for Mathematics Achievement and Dr. Kirsty Fleming from the Kentucky Center for Mathematics. This agenda item will discuss new activity related to the Mathematics Achievement Fund, Mathematics End-of-Course Assessment, other state initiatives and the Title II, part B Federal Mathematics and Science Partnerships. A third update on mathematics will be presented at the January 2007 Kentucky Board of Education meeting by Jefferson County concerning local mathematics initiatives.

#### **Mathematics Achievement Fund (KRS 158.840; KRS 158.844; 704 KAR 3:350; KRS 156.553)**

The Mathematics Achievement Fund was created to provide developmentally appropriate diagnostic assessment and intervention services to students, primary through grade twelve (12) to help them reach proficiency in mathematics. The first round of Mathematics Achievement Fund Grants were awarded to forty-five (45) schools in May 2006. The forty-five (45) grants are in twenty-five (25) school districts and these are implementing the *Math Recovery* or *Number Worlds* programs.

The Request for Application for the second round of Mathematics Intervention Grants for primary grades mathematics intervention and diagnostic assessment is posted on the KDE

web page. Technical assistance for the grants was offered at four (4) locations across the state (Jenny Wiley State Park in Prestonsburg, Ken Lake State Park in Hardin, General Butler State Park in Carrollton and Lake Cumberland in Jamestown). It is anticipated 40 schools with primary students identified as struggling in mathematics will be notified in February 2007 that they have been successful in the application process. *Math Recovery* training and *Number Worlds* training for the awarded schools that select either of these programs will be offered in summer 2007 by the Kentucky Center for Mathematics. Schools participating in the Mathematics Achievement Fund receive \$70,000 the first year and \$60,000 the second year.

#### *Teachers Professional Growth Funds*

With Teachers Professional Growth Funds, the Kentucky Center for Mathematics trained 67 elementary, middle and high school teachers in the summer of 2006 to be mathematics coaches and mentors. The Center is anticipating training a new cadre of mathematics coaches in summer 2007 in addition to offering an updated training to the first round of mathematics coaches.

#### *Committee for Mathematics Achievement*

The Committee for Mathematics Achievement is currently reviewing research, hearing presentations and evaluating intermediate and middle school intervention programs. Analysis and evaluation of the middle school mathematics intervention programs should be completed by January 2007.

#### *Middle School Mathematics Technology Intervention Programs*

Six school districts are piloting Middle School Mathematics Technology Intervention Programs for the 2006-07 and 2007-08 school years. These districts were awarded \$200,000 each year to implement either the *Carnegie Tutor* or *I Can Learn* middle school mathematics technology programs. Washington County, Marion County and Campbellsville Independent are implementing *I Can Learn* and Shelby County, Madison County and Clark County are implementing *Carnegie Tutor*. The Kentucky Center for Mathematics will be conducting an evaluation of these programs as well as conducting an evaluation of twelve (12) other middle schools that are implementing the *America's Choice Ramp Up* program.

### **Diagnostic Assessments for Algebra I, Geometry, and Algebra II**

Dale Brown, Warren County Superintendent; Dr. Bill Bush, University of Louisville; Dr. Wanda Weidemann, Western KY University; mathematics teachers from five high performing school districts and KDE mathematics consultants developed diagnostic assessments for Algebra I, Algebra II and Geometry core content. There are three parallel versions of each of the assessments that include five to eight modules for each course. The assessments were field tested in May 2006 by teachers in the five local school districts. A Mathematics Summit was held November 6 in Bowling Green in collaboration with Green River Regional Education Cooperative (GRREC) and Warren County School District where CDs were given to each participant and binders were given to each school district. These included all three versions of the assessments, sample

scoring rubrics with student work, an introduction to the materials and resources for administering the assessments. One teacher from each middle school and high school in the state and one representative from each school district were invited to attend the Mathematics Summit.

### **NCLB, Title II, Part B Mathematics/Science Partnership Grants**

The Mathematics and Science Partnership (MSP) program is intended to increase the academic achievement of students in mathematics and science by enhancing the content knowledge and teaching skills of classroom teachers. Partnerships between high-need school districts and the science, technology, engineering, and mathematics (STEM) faculty in institutions of higher education are at the core of these improvement efforts. Other partners may include state education agencies, other public schools, businesses, and nonprofit or for-profit organizations concerned with mathematics and science education.

NCLB, Title II, part B, Mathematics and Science Partnerships program is a formula grant program to the states, with the size of individual state awards based on student population and poverty rates.

There are currently four Tiered Mentoring programs: West KY Partners with Murray State University, Fayette County School District, Green River Regional Educational Cooperative (GRREC) and Morehead State University (science focus). Tiered Mentoring grant recipients are in year three of a three-year grant implementing a program in mathematics and/or science designed to increase teacher content knowledge as well as pedagogical knowledge and skills.

There are also three (3) High School Mathematics Alliances currently in year two of a three-year grant: Fayette County, GRREC and Murray State. These alliances are professional learning communities involving all partners in the ongoing study of important conceptual and pedagogical issues facing high school mathematics teachers in the areas of algebra, geometry and integrated mathematics. The alliances focus on:

- Developing, implementing and revising units of study centered around important concepts of algebra and geometry, or integrated approaches to those areas, and/or
- Developing end of course assessments for such high school courses as Algebra I, Geometry, Algebra II and Integrated Mathematics.

Other mathematics initiatives in which the Kentucky Department of Education is involved as a key partner are described in Attachment A.

### **Impact on Getting to Proficiency:**

Providing resources and training for teachers of mathematics and struggling mathematics students will lead to increased student achievement and teacher quality.

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**Deputy Commissioner**

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**Interim Commissioner of Education**

**Date:**

December 2006

## Mathematics Initiatives Attachment A

### **Mathematics Leadership Support Network**

KDE and the Partnership for Mathematics and Science Education Reform at University of Kentucky have three Mathematics Leadership Support Networks (two in Lexington and one in Elizabethtown). The Mathematics Leadership Support Networks (MLSN) are professional learning communities that allow for reflection on the latest research on teaching and learning in the area of mathematics. The MLSNs address implementation of the Core Content for Assessment 4.1, the Kentucky Program of Studies, and design, pilot and revise products for KDE such as units of study and lesson plans. In the 2005-06 school year 127 teachers participated in the MLSNs representing 58 school districts. A total of 190 participants will attend monthly meetings and throughout the 2006-07 academic school year and a three-day summer workshop.

### **E-Learning Kentucky Grant**

The E-Learning Kentucky Grant is a five-year grant involving the Kentucky Department of Education, Kentucky Educational Television (KET), Education Professional Standards Board (EPSB), Jefferson County Public Schools, Education Development Center and eight other states to develop high quality online courses and train high quality online facilitators to deliver the professional development courses. The current first-year focus is on elementary and middle school Mathematics, English and Language Arts content.

E-Learning Kentucky courses are free to Kentucky public school educators and provide professional development to improve teachers' content knowledge, improve teaching practices and increase student achievement. Courses began September 2006 for the fall session.

### **Mathematics Research Project**

A mathematics research project to examine the effectiveness of online teaching in traditional classrooms is being conducted by The Collaborative for Teaching and Learning and supported by KDE. The research will examine two different models of implementation of online Algebra I instruction. The research and models will be designed during the 2006-2007 school year with implementation of the models during the 2007-2008 school year.

### **Project Lead the Way**

Career and Technical Education is part of a multi-state initiative, Project Lead the Way, that has developed a four-year sequence of courses. These courses, combined with high

school college prep mathematics and science courses, introduce students to the scope, rigor and discipline of engineering and engineering technology prior to entering college.

### **Green River Regional Educational Cooperative K-8 Mathematics Initiative**

The Green River Regional Educational Cooperative K-8 Mathematics Initiative held in summer 2006 involved over 200 teachers from 14 school districts and 47 schools. The summer training included Carnegie Tutor's Bridges to Algebra, content training, formative assessment and measuring progress. There will be a five-day follow-up to the training during the 2006-07 school year and training for teachers in the local school districts that did not attend the summer 2006 training. A book study will be held in December 2006 around student responsibility for their own learning.

### **Aviation Partnership Workshops**

The Kentucky Department of Education is partnering with the Kentucky Department of Aviation and Kentucky Department of Transportation to offer teacher training in aviation to integrate mathematics, science and social studies in the middle school and high school curriculum. The Aviation Partnership offered three workshops in the summer of 2006 involving 70 teachers across the state with on-going training at the Kentucky Science Teachers Association conference and the Kentucky Teaching and Learning Conference. The Aviation Partnership is planning to offer five workshops in the summer of 2007. Pilots from the Department of Aviation are available to work with teachers in their classrooms during the school year and teachers received materials to implement the aviation units.

### **American Diploma Project (ADP) and Achieve, Inc.**

Achieve, Inc. is a multi-state initiative involving eleven (11) state cooperatives to develop end-of-course assessments and assessment modules for Algebra II content. The Kentucky Department of Education, Council on Postsecondary Education and P-16 Council have worked with the American Diploma Project (ADP) and Achieve, Inc. to incorporate the ADP Benchmarks in the high school Core Content for Assessment 4.1 and the revised Kentucky Program of Studies.

### **Louisville Science Center**

KDE collaborates with the Louisville Science Center on the Inquiry Learning Project to integrate mathematics in the Inquiry Project. Mathematics consultants will continue to collaborate with the project and will mentor teachers during the school year to incorporate inquiry-based lessons in the classrooms. The Inquiry Learning Project has produced a CD and a DVD with sample lessons and video clips of teachers teaching inquiry lessons in science, mathematics, social studies and language arts. The CD and DVD have been distributed to teachers at the Kentucky Teaching and Learning conference, KY Science Teachers Association conference and to individual school districts by request.

## Mathematics Initiatives

### Attachment A

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### **Kentucky Educational Television and Applied Mathematics**

KDE and Kentucky Educational Television (KET) are collaborating on a Construction Geometry course. The geometry content of the course will be delivered by a certified mathematics teacher through KET. Students successfully completing two of the three career and technical courses that include the geometry core content will receive a career and technical construction certificate and a mathematics geometry credit for high school graduation.

### **Career and Technical Education Master Teacher Training**

KDE offered a weeklong training in August 2006 to train mathematics teachers on teaching courses using applied mathematics. The master teachers are working online with thirteen units during the 2006-2007 school year as on-going training for applied mathematics courses. The master teachers will offer professional development to high school teachers on teaching applied, integrated mathematics courses.

### **The Kentucky Academy of Mathematics and Science**

The Kentucky Academy of Mathematics and Science at Western Kentucky University (WKU) will open in the fall of 2007. The Academy will offer a residential early admissions college program for bright, highly motivated Kentucky high school students who have demonstrated interest in pursuing careers in science, technology, engineering and mathematics. Academy students will have room, board and tuition provided.

### **Office of Career and Technical Education and Kentucky Community and Technical College System (KCTCS)**

KDE, the Office of Career and Technical Education and KCTCS are collaborating to review career and technical courses taught at KCTCS to develop mathematics connections and applications in the courses.

### **Kentucky Council of Teachers of Mathematics (KCTM) and T<sup>3</sup> Conference**

KDE mathematics consultants are collaborating with KCTM and Texas Instruments' Teachers Teaching with Technology (T<sup>3</sup>) to plan a joint conference in fall 2007 to incorporate technology and mathematics in the classroom curriculum.

### **Explorer Schools and Challenger Center**

KDE is collaborating with the NASA supported programs in the four Explorer schools and Challenger Centers in Kentucky. This is on-going work that has been done in the past; however NASA is updating the curriculum in both programs and KDE mathematics

consultants will be working with the new curriculum and teaching units for both programs.